

contd.
B3

hypertension, angina pectoris, thromboses, restenoses, myocardial infarction, strokes, cardiac insufficiency, pulmonary hypertonia, erectile dysfunction, asthma bronchiale, chronic kidney insufficiency, diabetes or cirrhosis of the liver, said composition comprising an amount efficacious for said treatment or prevention of a compound of formula I as claimed in claim 1, a stereoisomeric form thereof, or a physiologically acceptable salt thereof, or a mixture of two or more of any of the foregoing, and at least one pharmaceutically acceptable carrier.

REMARKS

I. Amendments to the Application

The first paragraph of the specification has been amended to recite Applicants' claim for benefit of priority, and to incorporate the prior applications by reference.

Claims 1-8 and 14-22 are pending. Claims 9-13 have been canceled in the divisional application transmittal letter filed on November 28, 2001, and claims 1 and 14-17 have been amended, all without prejudice or disclaimer.

Claims 1 and 14-16 have been amended to claim the subgenus of Applicants' invention in which A² of formula I is a heterocycle. This subject matter was not elected and was canceled without prejudice or disclaimer from the parent application No. 09/349,933.

Claims 16 and 17 have also been amended to clarify that the compositions according to the invention comprise one or more pharmaceutically acceptable carriers. Support for this amendment may be found throughout the application as originally filed, and in particular, in claims 16 and 17 as originally filed.

CONCLUSION

Applicants respectfully contend that the present claims are in condition for allowance, and request an early and favorable Office Action on the merits.

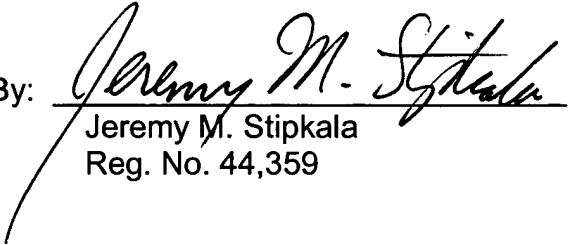
Please grant any extensions of time required to enter this Preliminary Amendment and charge any fees required under 37 C.F.R. §§ 1.16 or 1.17 to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: January 29, 2002

By:


Jeremy M. Stipkala
Reg. No. 44,359

Enclosure: Appendix

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APPENDIX

Marked up Version of Amendments

IN THE SPECIFICATION:

In accordance with 37 C.F.R. § 1.121(b)(1), Applicants present the amended paragraph from the specification in marked-up form. Underlining shows additions, and square brackets with strike-through font show deletions [~~like this~~]. If a discrepancy exists between the language of the paragraph in the body of the Preliminary Amendment above and the language of the paragraph set forth below, then the paragraph in the body of the Preliminary Amendment above controls. The marked-up paragraph reads as follows:

The present application claims priority under 35 U.S.C. § 120 to U.S. Application No. 09/349,933 filed on July 8, 1999, and issued on January 1, 2002 as U.S. Patent No. 6,335,334, which claims priority under 35 U.S.C. § 119 to German patent applications No. 19830430.7 filed on July 8, 1998, and No. 19903126.6 filed on January 27, 1999; [~~Both priority~~] all three prior applications are [~~entirely~~] incorporated herein in their entirety by specific reference.

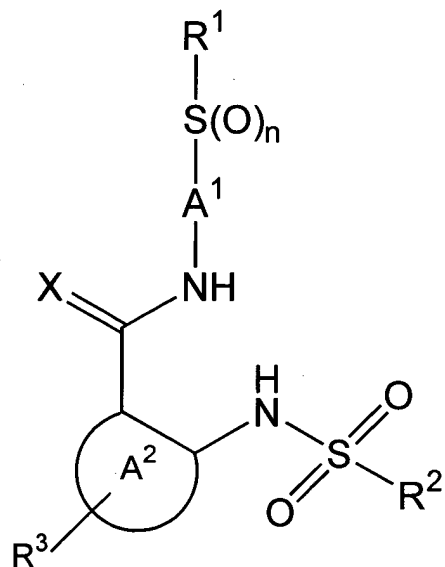
IN THE CLAIMS:

In accordance with 37 C.F.R. § 1.121(c)(1)(ii), Applicants present the amended claims in marked-up form. Underlining shows additions, and square brackets with strike-through font show deletions [~~like this~~]. If a discrepancy exists between the

language of a claim in the body of the Preliminary Amendment above and the language of a claim set forth below, then a claim in the body of the Preliminary Amendment above controls.

Claims 1 and 14-17 have been amended as follows:

1. (Once Amended) A compound of formula I, a stereoisomeric form thereof, or a physiologically acceptable salt thereof:



wherein

A¹ is a divalent residue chosen from phenylene, naphthylene, and heteroarylene, and is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, (C₁-C₅)-alkyl, phenyl, tolyl, CF₃, NO₂, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, (C₁-C₂)-alkylenedioxy, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -NH-CHO, -NH-CO-(C₁-C₅)-alkyl, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl,

heterocyclyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-phenyl, and -S(O)_n-tolyl;

A², which comprises the two carbon atoms bonded to the groups C(=X)-NH- and NH-SO₂R², is [~~a benzene ring,~~
~~a naphthalene ring,~~
~~a saturated or partially unsaturated 3-membered to 7-membered carbocycle,~~
a saturated or partially unsaturated or aromatic monocyclic 5-membered to 7-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, or
a saturated or partially unsaturated or aromatic bicyclic 8-membered to 10-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

R¹, when n in the group R¹-S(O)_n- is 0, is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or is -CN, or

when n in the group R¹-S(O)_n- is 1, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or

when n in the group R¹-S(O)_n- is 2, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or

R¹ is NR⁵R⁶;

R² is aryl, heterocyclyl, NR⁵R⁶, or (C₁-C₁₀)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴;

R³ is one or more identical or different residues chosen from hydrogen,

halogen, CF₃, OH, -O-(C₁-C₇)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, -O-aryl, (C₁-C₂)-alkylenedioxy, NO₂, -CN, NR⁷R⁸, -CO-NR⁷R⁸, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, -S(O)_n-(C₁-C₅)-alkyl, and (C₁-C₅)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴;

R⁴ is fluorine, OH, -O-(C₁-C₁₀)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, -O-aryl, -CN, NR⁷R⁸, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, or oxo;

R⁵ is hydrogen, (C₁-C₁₀)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R⁴ and aryl, or is aryl, heterocyclyl, -CO-NR⁷R⁸, -CO-aryl, or -CO-(C₁-C₁₀)-alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R⁴;

R⁶ is hydrogen, (C₁-C₁₀)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R⁴ and aryl, or is aryl, heterocyclyl, -CO-NR⁷R⁸, -CO-aryl, or -CO-(C₁-C₁₀)-alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R⁴;

or R⁵ and R⁶ together with the nitrogen atom to which they are bonded form a 5-membered to 8-membered saturated or partially unsaturated ring, wherein said ring optionally further comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and wherein said ring is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, (C₁-C₅)-alkyl, hydroxy-(C₁-C₃)-alkyl-, -(C₁-C₃)-alkyl-O-(C₁-C₄)-alkyl, aryl, CF₃, OH, -O-(C₁-C₇)-alkyl, -O-aryl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, (C₂-C₃)-alkylenedioxy, NR⁷R⁸, -CN, -CO-NH₂,

-CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-NH₂, -S(O)_n-NH-(C₁-C₃)-alkyl, -S(O)_n-N((C₁-C₃)-alkyl)₂, oxo, -(CH₂)_m-NH₂, -(CH₂)_m-NH-(C₁-C₄)-alkyl, and -(CH₂)_m-N((C₁-C₄)-alkyl)₂ where in the substituent -(CH₂)_m-N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, which optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁷ is hydrogen or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, wherein said ring optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁸ is hydrogen, -CO-(C₁-C₄)-alkyl, or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring which optionally further comprises an oxygen atom, a sulfur atom, or a group NR⁵ as ring member;

aryl is phenyl, naphthyl, or heteroaryl, and is unsubstituted or substituted by one or

more identical or different substituents chosen from halogen, (C₁-C₅)-alkyl, phenyl, tolyl, CF₃, -O-CF₃, NO₂, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, (C₁-C₂)-alkylenedioxy, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -NH-CHO, -NH-CO-(C₁-C₅)-alkyl, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-phenyl, and -S(O)_n-tolyl;

heteroaryl and heteroarylene, independently of each other, are a residue of a monocyclic 5-membered or 6-membered aromatic heterocycle or of a bicyclic 8-membered to 10-membered aromatic heterocycle, wherein said heterocycles comprise one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

heterocyclyl is a residue of a monocyclic or polycyclic 5-membered to 11-membered saturated or partially unsaturated heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, (C₁-C₅)-alkyl, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, and -CO-O-(C₁-C₅)-alkyl;

n is 0, 1, or 2;

m is 2, 3, or 4; and

X is oxygen or NH, or X is a nitrogen atom which via a single bond is attached to a ring carbon atom in the group A¹ which ring carbon atom is directly adjacent to the carbon atom in A¹ bonded to the group -NH-C(=X)- so that the group

-NH-C(=X)- together with the carbon atoms in A^1 bonded to it forms an anellated imidazole ring[;

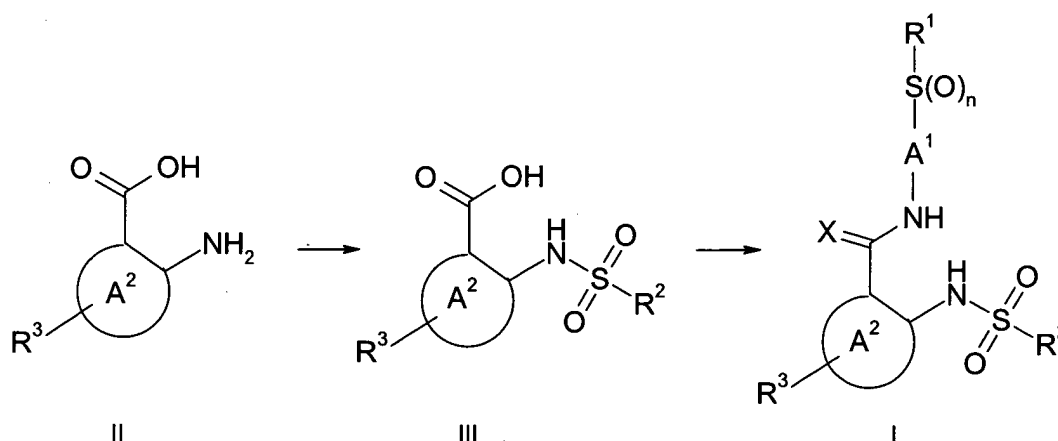
~~excluding the compound of formula I wherein simultaneously~~

~~A^2 is a benzene ring which is substituted in positions 3 and 5 by chlorine,~~

~~R^2 is methyl, X is oxygen, and $R^1\text{-S(O)}_n\text{-A}^1$ is a~~

~~5-chloro-2-(4-chlorophenylmercapto)-phenyl residue].~~

14. (Once Amended) A method for preparing a compound of formula I, comprising:
converting a cyclic aminocarboxylic acid compound of formula II into a
sulfonylaminocarboxylic acid compound of formula III; and
converting the sulfonylaminocarboxylic acid compound of formula III into a compound of
formula I:



wherein, in the compounds of formulae I, II, and III:

A^1 is a divalent residue chosen from phenylene, naphthylene, and heteroarylene, and

is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, (C₁-C₅)-alkyl, phenyl, tolyl, CF₃, NO₂, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, (C₁-C₂)-alkylenedioxy, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -NH-CHO, -NH-CO-(C₁-C₅)-alkyl, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-phenyl, and -S(O)_n-tolyl;

A², which comprises the two carbon atoms bonded to the groups C(=X)-NH- and NH-SO₂R², is ~~[a benzene ring,~~
~~a naphthalene ring,~~
~~a saturated or partially unsaturated 3-membered to 7-membered carbocycle,]~~
a saturated or partially unsaturated or aromatic monocyclic 5-membered to 7-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, or
a saturated or partially unsaturated or aromatic bicyclic 8-membered to 10-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

R¹, when n in the group R¹-S(O)_n- is 0, is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or is -CN, or
when n in the group R¹-S(O)_n- is 1, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or
when n in the group R¹-S(O)_n- is 2, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or

R^1 is NR^5R^6 ;

R^2 is aryl, heterocyclyl, NR^5R^6 , or (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^3 is one or more identical or different residues chosen from hydrogen, halogen, CF_3 , OH, $-O-(C_1-C_7)$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, (C_1-C_2) -alkylenedioxy, NO_2 , $-CN$, NR^7R^8 , $-CO-NR^7R^8$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, $-S(O)_n-(C_1-C_5)$ -alkyl, and (C_1-C_5) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^4 is fluorine, OH, $-O-(C_1-C_{10})$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, $-CN$, NR^7R^8 , $-CO-NH_2$, $-CO-NH-(C_1-C_3)$ -alkyl, $-CO-N((C_1-C_3)-alkyl)_2$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, or oxo;

R^5 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^6 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

or R^5 and R^6 together with the nitrogen atom to which they are bonded form a 5-membered to 8-membered saturated or partially unsaturated ring, wherein said ring optionally further comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and

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wherein said ring is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, (C₁-C₅)-alkyl, hydroxy-(C₁-C₃)-alkyl-, -(C₁-C₃)-alkyl-O-(C₁-C₄)-alkyl, aryl, CF₃, OH, -O-(C₁-C₇)-alkyl, -O-aryl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, (C₂-C₃)-alkylenedioxy, NR⁷R⁸, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-NH₂, -S(O)_n-NH-(C₁-C₃)-alkyl, -S(O)_n-N((C₁-C₃)-alkyl)₂, oxo, -(CH₂)_m-NH₂, -(CH₂)_m-NH-(C₁-C₄)-alkyl, and -(CH₂)_m-N((C₁-C₄)-alkyl)₂ where in the substituent -(CH₂)_m-N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, which optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁷ is hydrogen or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, wherein said ring optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁸ is hydrogen, -CO-(C₁-C₄)-alkyl, or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring which

optionally further comprises an oxygen atom, a sulfur atom, or a group NR^5 as ring member;

aryl is phenyl, naphthyl, or heteroaryl, and is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, $(\text{C}_1\text{-C}_5)\text{-alkyl}$, phenyl, tolyl, CF_3 , $-\text{O}-\text{CF}_3$, NO_2 , OH , $-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{O}-(\text{C}_2\text{-C}_4)\text{-alkyl-O}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $(\text{C}_1\text{-C}_2)\text{-alkylenedioxy}$, NH_2 , $-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{NH}-\text{CHO}$, $-\text{NH}-\text{CO}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{CN}$, $-\text{CO}-\text{NH}_2$, $-\text{CO}-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{CO}-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CO}-\text{OH}$, $-\text{CO}-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, heterocyclyl, CHO , $-\text{CO}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{S}(\text{O})_n-(\text{C}_1\text{-C}_4)\text{-alkyl}$, $-\text{S}(\text{O})_n\text{-phenyl}$, and $-\text{S}(\text{O})_n\text{-tolyl}$;

heteroaryl and heteroarylene, independently of each other, are a residue of a monocyclic 5-membered or 6-membered aromatic heterocycle or of a bicyclic 8-membered to 10-membered aromatic heterocycle, wherein said heterocycles comprise one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

heterocyclyl is a residue of a monocyclic or polycyclic 5-membered to 11-membered saturated or partially unsaturated heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, $(\text{C}_1\text{-C}_5)\text{-alkyl}$, OH , $-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{O}-(\text{C}_2\text{-C}_4)\text{-alkyl-O}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, NH_2 , $-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CN}$, $-\text{CO}-\text{NH}_2$, $-\text{CO}-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{CO}-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CO}-\text{OH}$, and $-\text{CO}-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$;

n is 0, 1, or 2;

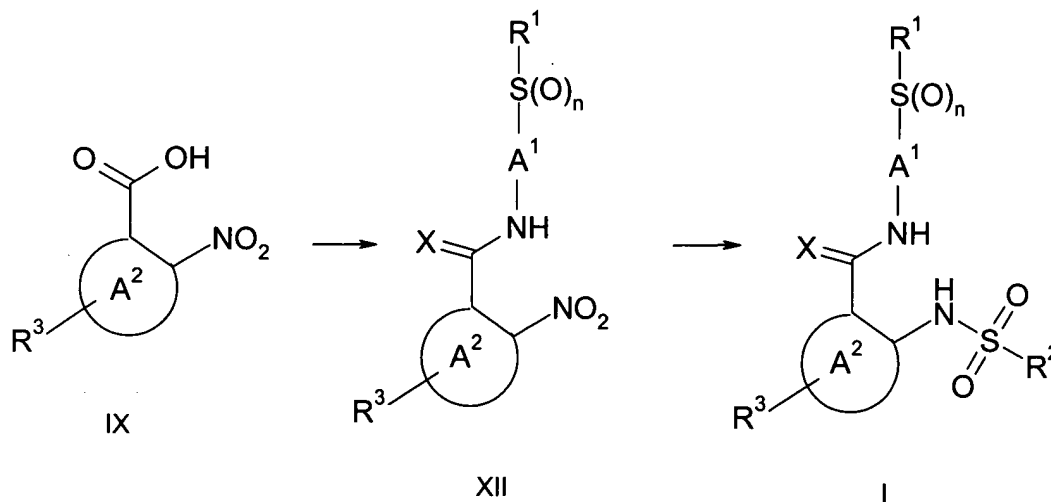
m is 2, 3, or 4; and

X is oxygen or NH , or X is a nitrogen atom which via a single bond is attached to a ring

carbon atom in the group A¹ which ring carbon atom is directly adjacent to the carbon atom in A¹ bonded to the group -NH-C(=X)- so that the group -NH-C(=X)- together with the carbon atoms in A¹ bonded to it forms an anellated imidazole ring;

or when one or more of said residues, independent of each other, are present in protected form or in a form of precursor groups.

15. (Once Amended) A method for preparing a compound of formula I, comprising:
- converting a cyclic nitrocarboxylic acid compound of formula IX into a nitrocarboxamide compound of formula XII; and
- converting the nitrocarboxamide compound of the formula XII into a compound of formula I by
- reducing the nitro group to an amino group, and
- sulfonylating the amino group:



wherein, in the compounds of formulae IX, XII, and I:

A¹ is a divalent residue chosen from phenylene, naphthylene, and heteroarylene, and is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, (C₁-C₅)-alkyl, phenyl, tolyl, CF₃, NO₂, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, (C₁-C₂)-alkylenedioxy, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -NH-CHO, -NH-CO-(C₁-C₅)-alkyl, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-phenyl, and -S(O)_n-tolyl;

A², which comprises the two carbon atoms bonded to the groups C(=X)-NH- and NH-SO₂R², is ~~[a benzene ring,~~
~~a naphthalene ring,~~
~~a saturated or partially unsaturated 3-membered to 7-membered carbocycle,]~~
a saturated or partially unsaturated or aromatic monocyclic 5-membered to 7-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, or
a saturated or partially unsaturated or aromatic bicyclic 8-membered to 10-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

R¹, when n in the group R¹-S(O)_n- is 0, is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or is -CN, or

when n in the group R¹-S(O)_n- is 1, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or

when n in the group $R^1-S(O)_n-$ is 2, R^1 is aryl, heterocyclyl, or (C_1-C_{18}) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 , or

R^1 is NR^5R^6 ;

R^2 is aryl, heterocyclyl, NR^5R^6 , or (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^3 is one or more identical or different residues chosen from hydrogen, halogen, CF_3 , OH, $-O-(C_1-C_7)$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, (C_1-C_2) -alkylenedioxy, NO_2 , $-CN$, NR^7R^8 , $-CO-NR^7R^8$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, $-S(O)_n-(C_1-C_5)$ -alkyl, and (C_1-C_5) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^4 is fluorine, OH, $-O-(C_1-C_{10})$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, $-CN$, NR^7R^8 , $-CO-NH_2$, $-CO-NH-(C_1-C_3)$ -alkyl, $-CO-N((C_1-C_3)\text{-alkyl})_2$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, or oxo;

R^5 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^6 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

or R^5 and R^6 together with the nitrogen atom to which they are bonded form a

5-membered to 8-membered saturated or partially unsaturated ring, wherein said ring optionally further comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and wherein said ring is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, (C₁-C₅)-alkyl, hydroxy-(C₁-C₃)-alkyl-, -(C₁-C₃)-alkyl-O-(C₁-C₄)-alkyl, aryl, CF₃, OH, -O-(C₁-C₇)-alkyl, -O-aryl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, (C₂-C₃)-alkylenedioxy, NR⁷R⁸, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-NH₂, -S(O)_n-NH-(C₁-C₃)-alkyl, -S(O)_n-N((C₁-C₃)-alkyl)₂, oxo, -(CH₂)_m-NH₂, -(CH₂)_m-NH-(C₁-C₄)-alkyl, and -(CH₂)_m-N((C₁-C₄)-alkyl)₂ where in the substituent -(CH₂)_m-N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, which optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁷ is hydrogen or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, wherein said ring optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁸ is hydrogen, -CO-(C₁-C₄)-alkyl, or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the

substituent $N((C_1-C_4)\text{-alkyl})_2$ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring which optionally further comprises an oxygen atom, a sulfur atom, or a group NR^5 as ring member;

aryl is phenyl, naphthyl, or heteroaryl, and is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, $(C_1-C_5)\text{-alkyl}$, phenyl, tolyl, CF_3 , $-O-CF_3$, NO_2 , OH , $-O-(C_1-C_5)\text{-alkyl}$, $-O-(C_2-C_4)\text{-alkyl-O-(C}_1\text{-C}_3\text{)-alkyl}$, $(C_1-C_2)\text{-alkylenedioxy}$, NH_2 , $-NH-(C_1-C_3)\text{-alkyl}$, $-N((C_1-C_3)\text{-alkyl})_2$, $-NH-CHO$, $-NH-CO-(C_1-C_5)\text{-alkyl}$, $-CN$, $-CO-NH_2$, $-CO-NH-(C_1-C_3)\text{-alkyl}$, $-CO-N((C_1-C_3)\text{-alkyl})_2$, $-CO-OH$, $-CO-O-(C_1-C_5)\text{-alkyl}$, heterocyclyl, CHO , $-CO-(C_1-C_5)\text{-alkyl}$, $-S(O)_n-(C_1-C_4)\text{-alkyl}$, $-S(O)_n\text{-phenyl}$, and $-S(O)_n\text{-tolyl}$;

heteroaryl and heteroarylene, independently of each other, are a residue of a monocyclic 5-membered or 6-membered aromatic heterocycle or of a bicyclic 8-membered to 10-membered aromatic heterocycle, wherein said heterocycles comprise one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

heterocyclyl is a residue of a monocyclic or polycyclic 5-membered to 11-membered saturated or partially unsaturated heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, $(C_1-C_5)\text{-alkyl}$, OH , $-O-(C_1-C_5)\text{-alkyl}$, $-O-(C_2-C_4)\text{-alkyl-O-(C}_1\text{-C}_3\text{)-alkyl}$, NH_2 , $-NH-(C_1-C_3)\text{-alkyl}$, $-N((C_1-C_3)\text{-alkyl})_2$, $-CN$, $-CO-NH_2$, $-CO-NH-(C_1-C_3)\text{-alkyl}$, $-CO-N((C_1-C_3)\text{-alkyl})_2$, $-CO-OH$, and $-CO-O-(C_1-C_5)\text{-alkyl}$;

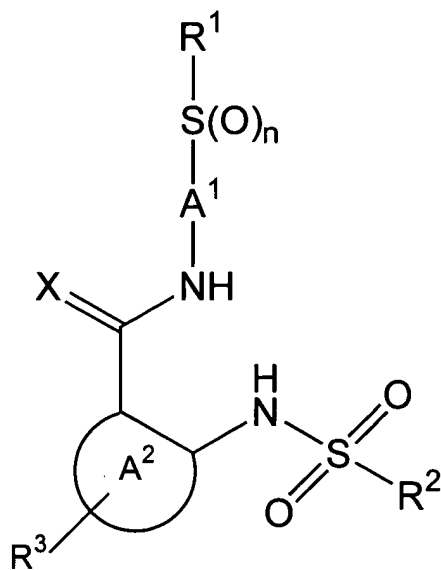
n is 0, 1, or 2;

m is 2, 3, or 4; and

X is oxygen or NH, or X is a nitrogen atom which via a single bond is attached to a ring carbon atom in the group A¹ which ring carbon atom is directly adjacent to the carbon atom in A¹ bonded to the group –NH-C(=X)– so that the group –NH-C(=X)– together with the carbon atoms in A¹ bonded to it forms an anellated imidazole ring;

or when one or more of said residues, independent of each other, are present in protected form or in a form of precursor groups.

16. (Once Amended) A composition, comprising a compound of formula I:



wherein

A¹ is a divalent residue chosen from phenylene, naphthylene, and heteroarylene, and

is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, (C₁-C₅)-alkyl, phenyl, tolyl, CF₃, NO₂, OH, -O-(C₁-C₅)-alkyl, -O-(C₂-C₄)-alkyl-O-(C₁-C₃)-alkyl, (C₁-C₂)-alkylenedioxy, NH₂, -NH-(C₁-C₃)-alkyl, -N((C₁-C₃)-alkyl)₂, -NH-CHO, -NH-CO-(C₁-C₅)-alkyl, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, heterocyclyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-phenyl, and -S(O)_n-tolyl;

A², which comprises the two carbon atoms bonded to the groups C(=X)-NH- and NH-SO₂R², is ~~a benzene ring,~~
~~a naphthalene ring,~~
~~a saturated or partially unsaturated 3-membered to 7-membered carbocycle,~~
a saturated or partially unsaturated or aromatic monocyclic 5-membered to 7-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, or
a saturated or partially unsaturated or aromatic bicyclic 8-membered to 10-membered heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

R¹, when n in the group R¹-S(O)_n- is 0, is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or is -CN, or
when n in the group R¹-S(O)_n- is 1, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or
when n in the group R¹-S(O)_n- is 2, R¹ is aryl, heterocyclyl, or (C₁-C₁₈)-alkyl which is unsubstituted or substituted by one or more identical or different residues R⁴, or

R^1 is NR^5R^6 ;

R^2 is aryl, heterocyclyl, NR^5R^6 , or (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^3 is one or more identical or different residues chosen from hydrogen, halogen, CF_3 , OH, $-O-(C_1-C_7)$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, (C_1-C_2) -alkylenedioxy, NO_2 , $-CN$, NR^7R^8 , $-CO-NR^7R^8$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, $-S(O)_n-(C_1-C_5)$ -alkyl, and (C_1-C_5) -alkyl which is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^4 is fluorine, OH, $-O-(C_1-C_{10})$ -alkyl, $-O-(C_2-C_4)$ -alkyl- $O-(C_1-C_7)$ -alkyl, $-O$ -aryl, $-CN$, NR^7R^8 , $-CO-NH_2$, $-CO-NH-(C_1-C_3)$ -alkyl, $-CO-N((C_1-C_3)-alkyl)_2$, $-CO-OH$, $-CO-O-(C_1-C_5)$ -alkyl, heterocyclyl, or oxo;

R^5 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

R^6 is hydrogen, (C_1-C_{10}) -alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from R^4 and aryl, or is aryl, heterocyclyl, $-CO-NR^7R^8$, $-CO$ -aryl, or $-CO-(C_1-C_{10})$ -alkyl wherein the alkyl residue is unsubstituted or substituted by one or more identical or different residues R^4 ;

or R^5 and R^6 together with the nitrogen atom to which they are bonded form a 5-membered to 8-membered saturated or partially unsaturated ring, wherein said ring optionally further comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and

wherein said ring is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, (C₁-C₅)-alkyl, hydroxy-(C₁-C₃)-alkyl-, -(C₁-C₃)-alkyl-O-(C₁-C₄)-alkyl, aryl, CF₃, OH, -O-(C₁-C₇)-alkyl, -O-aryl, -O-(C₂-C₄)-alkyl-O-(C₁-C₇)-alkyl, (C₂-C₃)-alkylenedioxy, NR⁷R⁸, -CN, -CO-NH₂, -CO-NH-(C₁-C₃)-alkyl, -CO-N((C₁-C₃)-alkyl)₂, -CO-OH, -CO-O-(C₁-C₅)-alkyl, CHO, -CO-(C₁-C₅)-alkyl, -S(O)_n-(C₁-C₄)-alkyl, -S(O)_n-NH₂, -S(O)_n-NH-(C₁-C₃)-alkyl, -S(O)_n-N((C₁-C₃)-alkyl)₂, oxo, -(CH₂)_m-NH₂, -(CH₂)_m-NH-(C₁-C₄)-alkyl, and -(CH₂)_m-N((C₁-C₄)-alkyl)₂ where in the substituent -(CH₂)_m-N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, which optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁷ is hydrogen or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring, wherein said ring optionally further comprises an oxygen atom, sulfur atom, or a group NR⁵ as a ring member;

R⁸ is hydrogen, -CO-(C₁-C₄)-alkyl, or (C₁-C₇)-alkyl which is unsubstituted or substituted by one or more identical or different substituents chosen from OH, -O-(C₁-C₅)-alkyl, NH₂, -NH-(C₁-C₄)-alkyl, and -N((C₁-C₄)-alkyl)₂ where in the substituent N((C₁-C₄)-alkyl)₂ the two alkyl groups are independent, identical or different, or are connected by a single bond and together with the nitrogen atom to which they are bonded form a 5-membered to 7-membered ring which

optionally further comprises an oxygen atom, a sulfur atom, or a group NR^5 as ring member;

aryl is phenyl, naphthyl, or heteroaryl, and is unsubstituted or substituted by one or more identical or different substituents chosen from halogen, $(\text{C}_1\text{-C}_5)\text{-alkyl}$, phenyl, tolyl, CF_3 , $-\text{O}-\text{CF}_3$, NO_2 , OH , $-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{O}-(\text{C}_2\text{-C}_4)\text{-alkyl-O}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $(\text{C}_1\text{-C}_2)\text{-alkylenedioxy}$, NH_2 , $-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{NH}-\text{CHO}$, $-\text{NH}-\text{CO}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{CN}$, $-\text{CO}-\text{NH}_2$, $-\text{CO}-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{CO}-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CO}-\text{OH}$, $-\text{CO}-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, heterocyclyl, CHO , $-\text{CO}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{S}(\text{O})_n-(\text{C}_1\text{-C}_4)\text{-alkyl}$, $-\text{S}(\text{O})_n\text{-phenyl}$, and $-\text{S}(\text{O})_n\text{-tolyl}$;

heteroaryl and heteroarylene, independently of each other, are a residue of a monocyclic 5-membered or 6-membered aromatic heterocycle or of a bicyclic 8-membered to 10-membered aromatic heterocycle, wherein said heterocycles comprise one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur;

heterocyclyl is a residue of a monocyclic or polycyclic 5-membered to 11-membered saturated or partially unsaturated heterocycle which comprises one or more ring heteroatoms chosen from nitrogen, oxygen, and sulfur, and which is unsubstituted or substituted by one or more identical or different substituents chosen from fluorine, $(\text{C}_1\text{-C}_5)\text{-alkyl}$, OH , $-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$, $-\text{O}-(\text{C}_2\text{-C}_4)\text{-alkyl-O}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, NH_2 , $-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CN}$, $-\text{CO}-\text{NH}_2$, $-\text{CO}-\text{NH}-(\text{C}_1\text{-C}_3)\text{-alkyl}$, $-\text{CO}-\text{N}((\text{C}_1\text{-C}_3)\text{-alkyl})_2$, $-\text{CO}-\text{OH}$, and $-\text{CO}-\text{O}-(\text{C}_1\text{-C}_5)\text{-alkyl}$;

n is 0, 1, or 2;

m is 2, 3, or 4; and

X is oxygen or NH , or X is a nitrogen atom which via a single bond is attached to a ring

carbon atom in the group A¹ which ring carbon atom is directly adjacent to the carbon atom in A¹ bonded to the group –NH-C(=X)- so that the group –NH-C(=X)- together with the carbon atoms in A¹ bonded to it forms an anellated imidazole ring;

or a stereoisomer thereof, or a physiologically acceptable salt thereof, or a mixture of two or more of any of the foregoing; and

[a] at least one pharmaceutically acceptable carrier.

17. (Once Amended) A composition useful for the treatment or prevention of cardiovascular diseases, endothelial dysfunction, diastolic dysfunction, atherosclerosis, hypertension, angina pectoris, thromboses, restenoses, myocardial infarction, strokes, cardiac insufficiency, pulmonary hypertonia, erectile dysfunction, asthma bronchiale, chronic kidney insufficiency, diabetes or cirrhosis of the liver, said composition comprising an amount efficacious for said treatment or prevention of a compound of formula I as claimed in claim 1, a stereoisomeric form thereof, or a physiologically acceptable salt thereof, or a mixture of two or more of any of the foregoing, and [a] at least one pharmaceutically acceptable carrier.

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